SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

NOTES ON CONTINENTAL MINING—No. IV.

BELGIAN COAL FIELD, EAST.

Occupying the high lands around Liége lie the Upper Coal Mea-res of Belgium. It is thought by some that this district has suf-ed largely by denudation after the deposition of the Coal Mea-es, by which the superior beds of the western portion, from Namur Mons, were carried away. A wide difference is observable in the ality of the coals from different beds. They are characterised as , moderate, or lean, according to their facility of combustion. ar Liége are found the best measures for purity of quality and idity of combustion, while some of the lower beds yield so much as to be unfit for domestic use. It is said that for house coal it usual to mix earthy matters with some of the purer varieties to ard the rapid consumption. No instance of this came under our ect observation. At Charleroi there are extensive works for coal shing. The earthy coal is placed in a rectangular trough, 5 ft. 3 ft. by 2½ ft. The bottom of this trough is composed of wire, er the fashion of fine wicker work, and the whole arrangement is de to oscillate under water, after the manner of a jigging-machine, il the earthy particles have been dissolved out, and washed away. e clean coal is then shovelled out by men and girls, and a fresh arge introduced.

The method of working these coal measures has been considerably proved of late years. Formerly the thickest of the seams—that those of 3 ft. or 4 ft.—were worked by the system known in France the "*Methode par eboulement*." The miners, armed with picks, ack a huge portion of coal, and eventually detach it, escaping best they may at the moment of its fall. This primitive manner working necessarily left immense hollows or caverns in the mine, produced fissures in the superior strata, through which the sur-e water found its way to the coal beds beneath. Large pillars of l were left, so that not more than one-third of the measure was ually extracted. This plan is now everywhere completely aban-ed in favour of the method "*Par remblais*," known in England ong wall working. The whole of the coal is got out, the roof g carefully supported, in the first instance by timber, and per-nently by rough walling, filled in behind with the débris neces-ly detached in working the coal. The utmost care is taken in engineering point of view to avoid accidents, and secure the ty of the miners, though there seemed an amount of carelessness he part of the workmen in some of the pits, and notably so in case of the girl miners; but this coal field compares pretty fa-rably with England in regard to pit accidents. Most of the shafts pit-frames are covered in by substantial brick buildings, thus bling the drawing to be continued night and day, and during all thers—an essential condition of success in the working of these seams.

he produce of the Belgian collieries, embracing, as it does, so y varities, supplies every requirement to which fossil fuel is ap-able. It is transformed into coke for the blast-furnaces, sup-the heat for the iron works, and for other metallurgical pro-es in the kingdom, and furnishes fuel for domestic consumption ughout Belgium and North-East France. The small coal and are washed and pressed into blocks, for use in the locomotives me of the better qualities of these blocks selling as high as 4d. per ton. The *flenu* coal, unlike any English variety, and fat coals around Liége supply the important consumption in the ufacture of gas for lighting, and are sought after even in the works of Paris.

et us follow the coal in its interesting application to the manu-ure of gas. On every line of railway we see scores of wagons, n with the black treasure: join one of these trains. We hurry g the vale of the Meuse, across the frontier, and over the forest s of Ardennes, to Paris. From among the ten gas works of s we select for description that of La Villette, as being one of best examples of its kind. A branch line runs the railway-ks into the gas-house, and alongside the retorts, but at a higher . The wagons are there made to turn over, and deposit their ready for use. In winter this line alone brings about 700 tons day. The retorts are arranged in groups of seven, in such man-hat the two lowest are on each side of the furnace which heats the p; another three are fixed directly over these; and two others the divisions between the last three. Eight of these groups, side ide, are enclosed in a mass of strong masonry, about 55 yards . This arrangement is called a battery, of which there are no than eight at the gas works of La Villette, making a total of retorts of 8 ft. long. Day and night these are kept in operation. rkmen with long shovels fill the retort with coal; the front is closed with a plate carefully luted with refractory clay. The tile products disengaged by the intense heat in each retort are ed in one immense horizontal pipe, half filled with water, and ducted through the various processes of purification. The scene these retort-houses is tolerably bewildering to a stranger—thick uds of black smoke obscure the roof, lurid flames escape from the orts when opened, and the burning cinders contrast remarkably th the black walls, the coal heaps, and the half-naked workmen, vered with perspiration and coal-dust. When the distillation is ished the retort-plate is taken off, and, amidst smoke and flame, red-hot coke is drawn out into iron hand-carts, which are then out into the yard, and the burning mass tossed over on the und, whilst other workmen stand ready with buckets of water to ench the hot coke, which during this operation emits a peculiar nd, and sends forth abundant clouds of steam. The retorts are sooner emptied than they are re-charged with coal, and the same cess is repeated incessantly. The retorts in use at La Villette made on the premises from a mixture of marl, brought from the partment of Haute-Marne, and half its weight of cement. These redients are carefully ground together into the consistence of a e, and fashioned in a wooden mould, then slowly dried, and lly submitted to a very high temperature, when it becomes fit for

From the retorts the gas passes into the *barillet*, or large hori-tal pipe, above referred to. The pipe delivering the gas dips a e way into the water contained in the *barillet*, where the chief of the tar and oil is deposited. The excess of liquid in the *llet* above the normal level is drawn off by syphons, and con-d into vast underground cisterns, where the whole of the coal-tar and oily matters is finally collected. In passing from the *barillet* the gas is cooled through a series of U-shaped pipes, having water at their lower extremities, and is then made to traverse a series of cylinders filled with coke, there losing the last traces of tar and ammonia. These cylinders, some 18 ft. high, arranged in rows, form a notable feature in the general view of the gas works. The gas has yet to undergo one of its most important processes—that of purification from sulphuretted hydrogen by sulphate of iron, and from carbonic acid by lime water. This method has, moreover, the advantage of forming compounds which find a ready market—sulphate of lime and sesquioxide of iron. The gas is now fit for use, and is stored away in gasometers. Where ground is scarce, these are often made of the telescope form, so that when the lowest cylinder is full a second rises from the top, and, in like manner, a third above that.

But we have not done with the coal. The residue from the manufacture of coal gas has of late years given rise to new and extensive branches of industry. We have only space to enumerate the chief products. As we have already said, the coke produced is of great value for metallurgical purposes. Along the inside of the retorts there is gradually formed a hard carbonaceous mass, used for making crucibles, and for charcoal points for the electric light; it is sold at 24s. per cwt. The ammoniacal waters are utilised for special manures, while from the residue of these waters is formed the Prussian blue of commerce. From the tar the variety of products is almost endless. Various colouring matters—mauve, magenta, &c., now so extensively employed for dyeing cotton and silk; phenol, or carbolic acid, largely used in medicine; mirbane, which is the base of the perfumery used for soap; various fulminating powders; the bright colours of artificial flowers; the aroma of our sweetmeats; benzine, for dyeing and cleansing cloths; artificial preserves, in which the fruit specified plays no part; tints for the cheeks of faded age—all are extracted from the tar obtained by distilling coal. And there are not wanting those who look forward to another branch of industry as unexpected as it would be novel—the production of alcholic spirits from the same inexhaustible store. These products are not made at the gas works, but at special benzine and analine works to which the tar is sent.

The following table of the chief oily products of coal distillation we extract from Tissandier's admirable work:—

Light Oils....	Amylène distils at	Fahr. 102°
	Benzine	187°
	Toluène	226°
	Xylène	271°
	Pyridine.....	302°
Heavy Oils....	Cumène	304°
	Lutidine.....	311°
	Euplone	338°
	Cymène	347°
	Aniline	359°
	Carbolic acid	370°
	Naphtaline	422°
	Quinoléine.....	462°
	Antracène	500°
	Chrysène	572°
	Pyrène	572°

OUR COLONIAL GOLD FIELDS—QUEENSLAND.

Sir,—A few words about Queensland will be suitable to your paper, and will probably be acceptable to your readers. Queensland is the largest colony of the United Kingdom, and is probably destined to become one of the richest, if not the richest. It is geographically situated on the north-eastern portion of New Holland. Its seaboard extends eastward 1150 miles to the Pacific Ocean. Northward there is a seaboard of 700 miles to the Gulf of Carpentaria and the Indian Archipelago. The great extent of this colony may be imagined by the fact that it is much larger than the whole of Western Europe, and also much larger than the whole of British North America, itself of greater dimensions than the United States. The Island of New Guinea is only a few miles distant from the north point of the colony, near Port Albany, and this geologists proclaim to be one continuous gold field. Queensland occupies a position both in the temperate and torrid zones, and abounds in nearly all the productions of each, yet its exports are confined to wool, cotton, some coffee and sugar, and gold. Other exports are so limited that they are scarcely worth mentioning. Almost all the luxuries and necessaries of life are produced within the limits of the colony. Several towns and cities have sprung rapidly into existence, and the capital is not inconsiderable. Population is increasing, and the extension of cultivation is very encouraging. Game of numerous descriptions abounds, and the rivers teem with fish. Probably it is one of the most healthy (one would almost venture to say the very healthiest) countries in the world.

These general remarks introduce us to the subject of gold, as he who "goes to the diggings" ought as his first preparation to have some knowledge of the geographical and topographical character of the country, also of its climate and productions. Gold is met in all the districts of this noble colony. A very large number of men find employment in those auriferous fields, and, of course, labourers, mechanics, carriers, and shopkeepers follow them, so that already the regions bearing the most precious of metals provides for a vast body of emigrants. Of course the diggings are, as in most other gold-producing regions, alluvial and quartz—the latter before long destined to assume great importance. Yet, after all, few diggers amass wealth; many make a maintenance, but many more fail, and incur disease and death from fatigue, exposure, and disappointment. Pulmonary diseases, little known elsewhere in the colonies, are fearfully fatal to the diggers. In the mountain ranges, at the head of the rivers, the strata of the rocks, and general geological indications leave no doubt of rich unexplored fields of gold. Prospectors and explorers multiply, and their labours and sagacity are very frequently rewarded, especially when they have adequate capital and material.

"Gully raking" is one of the modes of gold seeking which often proves successful. A gully or water-course is followed; drift is removed from the ledges of rock; or the dirt washed down by the rains is carefully and vigilantly sifted, and is then taken to some water-hole to be "panned" with a tin dish. These trials generally decide whether search will be made in the flat soil created by the washings from the heavy rains from the rocks. If the search is successful, Government protects the finder, giving him a "claim," always half-a-dozen times larger than "claims" granted for agricultural purposes. But there is always an indiscriminate rush of miners to the land around the confines of the claim secured by law. Pieces of quartz are often picked up from the surface of the ground, in which specks of gold are visible. Whenever this is the case, there is a search for the reef or matrix. In the alluvial fields large nuggets have been rooted up worth thousands of pounds; and some of the quartz reefs have yielded a proportion of gold per ton equal, perhaps superior, to those of any other auriferous regions. The treasure in all forms—dust and nuggets—has been found in the wash drifts on the bed-rock, from 2 to 20 ft. below the surface, and nuggets up to 100 lbs. in weight have been found at the roots of the grass by the water-cour-es and gulleys. The "flats" into which the gulleys run are very prolific.

Anyone may dig, so as it is not on another man's recognised claim, by obtaining a Government licence at an expense of 10s. Gold uncoined is a circulating medium at the diggings, and in the country at 3s. 6d. a pennyweight. The quartz reef diggings are more permanent than the alluvial, but of course require more capital. A miner with merely a pick, a basket, and a tin pan who works hard may make 5*l.* to 10*l.* in the week, and may net as little as 10s. No employment could be more uncertain; it is literally a game of chance. The gold generally runs in narrow veins, occasionally dropping into pockets where accumulated treasures are found. The reef frequently crops out of the ground, and gold is not unfrequently found on the surface; but where no gold is seen there are considerable quantities found upon crushing. The rock is removed in Queensland invariably by boring and blasting.

The Government is at present exerting itself in favour of the mining interest generally. All business men have to pay 4*l.* per year licence, advancing the licence money before they enter upon their particular calling. A recent law, moreover, provides that the finders of all metallic and mineral deposits shall retain the sites of their discoveries until sufficient time has enabled them to work them at a profit. There can be no doubt of the wisdom of this legislation, for it is already ascertained that silver, silver-lead, lead, copper, coals, and various minor metals exist. It is a fact, however, that little attention is paid to any mining with the exception of gold.

Many of the gold fields had been occupied years and years before the discovery of the most precious of metals, although borings for wells and reservoirs were made on the very sites beneath which the gold awaited the miner's hand. Another curious circumstance connected with the history of the gold of Queensland is that at the Intercolonial Exhibition last year in Sydney (New South Wales) a long array of products represented Queensland, but no specimens of mines or minerals whatever. The list of products there appearing comprised coffee, cotton, sugar, wheat, arrowroot, maize, and maize flour, tapioca, cassareep, banana flour, tea, Paraguayan tea, red pepper, various oils, turmeric, ginger, cinnamon, indigo, madder. A long list of fruits and nutritious edible roots, honey, hemp, jute, China grass, paper straw. Tobacco of nearly every variety but Turkish, timber, flowering shrubs, flowers, but not one specimen of gold, silver, lead, copper, or coal, yet the mineral wealth of Queensland constitutes her noblest resources.

It may be appropriate to finish this letter with the remark that the whole population of this vast, fertile, healthy, and rich country is not half a million.

Gold Finder.

THE METALS AND THEIR ORES—No. IX

Sir,—Some of the metals also combine with the undermentioned elements:—

Phosphorus.—A very inflammable, semi-transparent, waxy-looking element, having a specific gravity of 1·8, insoluble in water. Many of the metals unite with phosphorus, and some of the resulting phosphides and phosphates are met with in abundance; generally, however, they are not found naturally in sufficiently profitable quantities to make it worth while to work for them alone. The chief metallic phosphates are those of cerium, copper, iron, lead, manganese, uranium, and yttria.

Carbon.—Found perfectly pure in the diamond, and nearly so in plumbago and some kinds of coal. The metallic combinations with this element are not very important, the only carburet of much consequence being that of iron.

A few facts relating to the diamond may be interesting, and not out of place here:—The specific gravity of the diamond is 3·48 to 3·55. It is chiefly found in India, the islands of Borneo and Celebes, in Malacca, the Brazils, and the Ural Mountains, being sometimes accompanied by grains of gold and platinum. It is supposed to be of vegetable origin, because when it is burnt in oxygen, carbonic acid gas, the sole product of the combustion, only remains. The diamond is distinguished and valued for its beauty, rarity, and extreme hardness, being the hardest substance in nature. Its surpassing brilliancy and adamantine lustre are due to its unusually high refractive power, by which the light passing through the gem is bent in various directions, and decomposed into all the colours of the spectrum. The polished diamond, when pure, is generally transparent, limpid, and colourless; but diamonds are sometimes met with of different colours—as yellow, rose, violet, green, brown, and even black. The uncut diamond in the rough, and associated with the pebbles and ochry gangue to which it is frequently attached, does not always present a very attractive appearance, and a gem probably worth a very large sum may easily be passed over unnoticed. The celebrated Koh-i-noor, in the possession of Her Majesty, was originally found in the mines of Southern India, and was worn by the Indian Rajah Karnah at least 4870 years ago. When of pure water, a brilliant may be approximately valued by squaring the weight of the stone in carats (a carat is about 4 grains), and multiplying by 12*l.*, the assumed market value of a 1-carat diamond. A rough diamond is worth approximately about half the price of a cut one. The diamond is found naturally crystallised in the octahedron form of the cubic series.

Hydrogen.—An inodorous, colourless, tasteless, invisible, inflammable gas, 14½ times lighter than air, being the lightest substance in nature, and itself a supposed metal. It combines with oxygen to p o-duce water, of which two-thirds consists of hydrogen gas. This element unites with a few of the metals forming hydrides, the chief of which are those of arsenic, potassium, tellurium, and zinc.

The metals have also an affinity for, and in somewhat rarer instances enter into, combinations with the elements bromine and fluorine, forming bromides and fluorides, and also with nitrogen, boron, and silicon; but the resulting compounds do not present any very interesting or important properties calling for remark at present. Some of the metals are found naturally combined with carbonic acid—an invisible and poisonous gas given off by respiration and combustion, 1½ times the weight of air, and composed of oxygen and carbon. The most common of the carbonates are those of copper, iron, lead, bismuth, manganese, silver, and zinc. The metals

barium, strontium, calcium, magnesium, and sodium also exist abundantly in combination with carbonic acid, as carbonate of barytes, carbonate of strontia, carbonate of lime, &c.

The following tabulated summary is intended to exhibit in a condensed form the chief physical characteristics of the metals described up to the present in these papers.

TABLE SHOWING THE CHIEF PROPERTIES OF THE METALS.

A—Malleable metals	Gold, silver, copper, tin, cadmium, platinum, lead, zinc, iron, nickel, and palladium.
B—Brittle metals	Arsenic, antimony, bismuth, cobalt, manganese, tungsten, tellurium, and uranium.
C—Most ductile	Gold, silver, platinum, iron, nickel, and copper.
D—Most tenacious	Iron, copper, platinum, silver, gold, and zinc.
E—Best conductors of heat	Silver, copper, gold, tin, iron, lead, & platinum.
F—Best electric conductors	Silver, copper, and gold.
G—Metals fusible below red heat	Antimony, arsenic, bismuth, cadmium, lead, lithium, magnesium, mercury, potassium, sodium, tellurium, tin, and zinc.
H—Fusible at a white heat	Silver, copper, gold, and cast-iron.
I—Fusible in a wind furnace.	Pure iron, nickel, manganese, cobalt, palladium.
J—Metals only fusible at highest temperature produced by art	Molybdenum, uranium, tungsten, chromium, titanium, cerium, osmium, iridium, rhodium, platinum, and tantalum.
K—Noble metals reducible by heat alone	Gold, irridium, mercury, osmium, palladium, platinum, rhodium, ruthenium, and silver.

The description of "The Metals and their Ores" will be resumed in my next paper to the Journal. EDWARD GLEDHILL.

Mining Offices, Shrewsbury, July 18.

STEAM-BOILER EXPLOSIONS.

SIR,—In the evidence given by two of the witnesses before the Select Committee appointed to enquire into the causes and remedy of boiler explosions, they were pleased to assert that six out of every seven explosions were due to the boiler-makers and masters, and by this reckless assertion—which is as much wanting in proof as it is in truth—abused the public mind, which is far too much disposed to receive the unqualified opinion of men in their position, regardless of the actual knowledge of the matter. This being the case, we, the boiler-makers of Manchester and surrounding district, beg to disabuse the public mind of the wrong impression it has received, through the thoughtless statements of men who ought to know better. We feel bound to do this, because we consider it to be a gross libel upon the honesty and ability of our trade in general. We, as boiler-makers, who thoroughly understand what boilers are, and consequently are better able to give judgment upon them than those whose knowledge extends no further than the theoretical, emphatically declare that the sole responsibility of boiler explosions rests upon unqualified masters who supply the boilers, and ignorant manufacturers who use them. Boiler-makers, in all cases, in the making of a boiler always work to a drawing, and that is the extent of their responsibility. If a boiler is required to work at a pressure of from 30 lbs. to 40 lbs. per square inch it is made strong in proportion to the work required, and so in all cases; and, therefore, if a boiler which is made only to sustain a safe working pressure of 40 lbs. be worked by a user at 70 lbs., and thus explodes (as in the case of the Middleton explosion), it is due, not to the malconstruction of the boiler, but to the ignorance and carelessness of the user. Again, if a user orders a boilers of a certain strength and quality of material, and, through the avarice and cupidity of the person who supplies him, he receives one of an inferior class—which is far too frequently the case where the person who supplies him has no real knowledge of boilers, but is only an employer of labour—that person is certainly responsible, and not the maker, who only does that which he is ordered. The practice cannot be too strongly deprecated of buying from old iron dealers old boilers newly painted to work at a pressure almost equal to new ones. We also attribute a great proportion of boiler explosions to the repairs executed by unqualified persons, who are not boiler-makers, replacing bad plates in boilers by plates very much worse; and whose services masters are far too willing to engage, under the miserable consideration in the cost of repairs of a few coppers; and this responsibility must rightly be attached to the person who employs such unskilled workmanship.

Allow us to say, in conclusion, that if the masters who manufacture boilers, and those who use them, would be more judicious in their selection of boilers made from the best material and after the most approved principle, we should rarely listen to the horrifying details of boiler explosions, and readily obviate the necessity of any more parliamentary committees to deal with such a destructive agent of human life as a steam-boiler most certainly is in the hands of an ignorant person. JAMES WILCOCK

(Secretary. pro tem., for the United Boiler Makers of Manchester.)

Birmingham-street, July 14.

MINING IN COLORADO.

SIR,—The main shaft of the Central Company's Mine, on the PRIZE LODE, has reached a depth of 270 ft. This mine has had irregular walls from the first, the ore vein sometimes widening out to 8 ft. or more, then growing narrow again till it was a mere thread. The present working has a large amount of ore in sight, the deepest shaft being in good pay. The ore vein has constantly averaged well in size and richness, the wide places making up fully for the narrow ones. The ore is a strange conglomeration of zinc blende, galena, and copper, and iron pyrites rich in gold and silver. A large amount of ore is now being taken out, which is sold to Prof. Hill for $80 per ton; it assays about $120, nearly $24 of which is silver. The balance of the ore is worked in a stamp-mill, and yields 6 ozs. to the cord.

Capt. Phillips has got through the cap on the JONES LODE, Nevada district, and is now chiselling beautiful ore from a 12-inch vein; it promises well, from the fact that the same quality in the adjoining claim yields 14 ozs. per cord (about 8 tons) under stamps.

The old RODERICK DHU LODE, abandoned since 1864, is turning out under the management of Scudder and Sullivan $1500 per week. They are working a big face, and will average during the summer about $7000 per month.

Moss and Co. are working four men in the gulch between Walker's mill and Prof. Hill's works, are taking out $17 per day to the man, which is good enough for anybody. The expense of working is very light; this, therefore, smacketh o' a good thing in the way of profits. That mining is looking up in Nevada district may be judged from the fact that nine mills, with an aggregate of 124 stamps, are now running there. B. C. Waterman will shortly start up the Kansas-Colorado mill with 32 stamps. There are 46 stamps, or nearly one-half more at work now in this district than at any time during last year.

A new shaft-house has been built over the SPARKS LODE; its dimensions are 30 by 46 ft. In this will be placed a new steam-pump and engine, now on the way from the East. These were rendered necessary by the increased water in the shaft, which the old pump was inadequate to remove. Mr. J. C. Fagan, manager of this mining company, is expected back in a few days.

Halkin's Claim still maintains its pre-eminence; it has a crevice which varies from 5 to 12 ft. to the cord. Seven cords (about 8 tons each) are taken out daily. This mine keeps 73 stamps in Black Hawk employed—Mead's mill, 20; Kimber's, 13; and 40 at the Black Hawk Company's mill.

A correspondent writes—"Mining intelligence from every quarter of the Georgetown region is to the effect that rich strikes are being made in the veins that are now being worked, which have hitherto produced ores of ordinary value. On every side are heard exciting and mysterious rumours from owners and miners of 'brittle silver,' worth so many hundred dollars per ton, 'ruby silver,' worth so many thousands per ton, and of 'silver glance' of fabulous value. Hearing these things the stranger would undoubtedly conclude, provided he took them for granted, that silver was bound to become a drug in the market. It is true that our mining prospects never looked brighter than at present."

Mr. W. Menderhall has arrived to be the superintendent of the STEVENS LODE—a fine rich vein, situated near Bakerville. It has a good record, as having produced handsome profits to its original owners.

Stewart and Co. have a number of mechanics at work on their new roasting establishment in Georgetown. The best part of two months will be consumed in arranging their works ready for definite operations. All work is being performed in the best and most substantial manner, showing a degree of permanency that inspires confidence in the enterprise.

A gentleman who has just returned from the Snake River gold mines, which region he examined most thoroughly, gives a most flattering account of that region, which is evidently the poor man's El Dorado. There are already from 400 to 500 miners scattered along a stretch of 150 miles of the river, who are doing well, though retarded somewhat by the high water. There appears to be no end to the number of paying bars along the river for hundreds of miles. Our informant was not up so far as Taylor's Bridge, but is satisfied that the diggings above that well-known point are as good as, and perhaps better, than those lower down. Men are now abandoning good paying bars to move on towards the upper waters of the stream. Knowing our informant to be perfectly reliable, and noticing his report agrees in the main with that of hundreds of others, there is no doubt that the Snake River district of Colorado is destined to rival many justly noted regions in other parts of Colorado and Montana.

British and Colorado Mining Bureau, July 14. WILLIAM COPE.

EBERHARDT AND AURORA MINING COMPANY.

SIR,—Permit me to reply to Mr. Haggard's letter. He cannot have read mine very carefully, or he would have seen that all my figures as to the *estimated* yield of ore and profits of the above company, are taken from statements put forward by the company; and that so far from omitting to refer to the "fact that the mills *to be* erected by this company *are to* crush 80 tons a day," it is the very fact which I sought to compare with the actual returns of the whole White Pine district for the quarter ending March 31. I am very glad to be assured by him "the profits of a neighbour's crushing for two months are $69,000." My assertion, as Mr. Haggard calls it, is not dwarfed by this statement of profits, as I must assume them to have been made either before or after the quarter to which I refer. If this profit was made prior to Jan. 1, what a falling off has taken place in White Pine district—if subsequent to March 31, the next quarterly return will show it.

The promoters of this company assume to themselves a virtue in "looking before leaping"—in other words, having the mines inspected prior to purchase. But where, I should like to ask, is the mining company that has not done the same? Reports by mining engineers, many of them by gentlemen of high standing and unimpeachable integrity, are appended by the dozen to every prospectus. And I appeal to any impartial observer to say whether the promised golden harvest is realised one time in twenty. Somehow or another they do, time and again, get the wool pulled over their eyes. These mines, which are the subject of this letter, are bought on the reports of Mr. Phillpotts and Mr. Attwood. I know nothing of Mr. Phillpotts, or his qualifications for reporting on silver mines. With Mr. Attwood I have had the pleasure of a personal acquaintance for years, and know him, as all his friends do, to be the soul of honour, and a gentleman who never puts his name to any report which he does not conscientiously believe to be true; but he is not infallible more than other men. I have before me a printed report which he made on the Lincoln Gold Mines about three years ago, in which he says "the mass of deposit in the outcrop above the level of the creek will afford on a very moderate calculation 800,000 tons of auriferous slate, which, after making ample allowance for cost of extraction and milling, would leave $4,800,000, or 940,000*l.* sterling. I have not examined any mine in California of which I think more highly." The figures seem almost too bewildering to be true; but the result was very simple. The stuff would not even pay working expenses, so the 940,000*l.* all faded away entirely, and the mine was stopped. It is, perhaps, scarcely fair to draw any inference whatever from the above, as it was a matter of notoriety at the time in California that the mine was "salted." It only shows that even the best mining engineers are sometimes led astray from some cause or another.

However, the Eberhardt and Aurora Mines have a good history, and are, independently of what I believe to be the exaggerated halo surrounding them, without doubt mines capable of paying large profits; and I hope, indeed, for the credit of Nevada, that they may realise the hopes of the promoters to the fullest extent. This concludes all I have to say about these particular mines.

If anyone should take the trouble to wade through this correspondence, he may well say *cui bono*. Briefly, then, as one for many years resident on the Pacific Coast, and connected with some of its leading mining interests, who believes that there is in California and Nevada a great and profitable field for the employment of capital, I protest against the exaggerated reports and assays put forth about mines brought here to be sold. One after another has come out within the past few months, with reports and assays so preposterous that to one who knows anything whatever of the mines of the Pacific Coast the gullibility of the English public is something to pity. Take, for instance, the assays from the mines of the Tuolumne Company—mines of which I know absolutely nothing—put those assays (all perfectly true, without doubt, from the *samples* sent home) before any Californian in his sober senses, and see what he will say.

It is time a warning was given. I have corresponded with you, Sir, for many years under the initial I shall append to this letter, and I have had plenty of abuse in your columns for venturing to doubt the amazing riches of, and reports on, many mines of the Pacific Coast, introduced into London under great auspices, of which not even a trace now remains. I beg to say that this closes this correspondence so far as I am concerned. Time alone will show how far I am wrong, and it is simply a waste of time now to answer every mere assertion and statement put forward to contradict absolute facts, however unpalatable those facts may be.—*London, July* 14. P.

MINING IN CORNWALL AND WALES.

SIR,—For some time past I have observed that brokers and parties interested in Welsh mines have been exerting themselves, even to an extreme degree, to try and show the public that the profit on those mines leave all other mining speculations far in the background—in fact, they are attempting to show that nothing is to be compared with them since the discovery of the Van Mine.

I am a staunch friend of mining, if carried on by legitimate principles, unaided by fairy tales; but everyone of these writers, if they have had seven years' experience, should know that what they write cannot be corroborated; while if those who speculate upon the faith of those statements were to read and study the Journal they would soon detect the fallacies, and avoid decoying reports, and those who make them. On the discovery of a promising mine these romancists attempt to show that every lode found within a large circumference is of the same character as the one in the mine already discovered, and is sure to turn up a trump—which is too frequently found to be a woeful mistake; and sometimes after those concerned have sunk the little capital they invested, without a chance of a shilling ever being returned.

The late Captain Francis was a great gun at this game; and I have had to make strong remarks respecting him to try and hold him in check, but I find he is now far out-generaled by some of the present would-be money gatherers; although if the majority of them were to give over trickery, and come to the market honestly, they would find it far better in the long run for themselves and their clients.

WELSH MINES.—I have surveyed these mines for a number of years, and watched them carefully, but I have yet to discover that they are superior to every other mining speculation: indeed, I am sure that the Cardigan and Merioneth mines have not paid back to the promoters one-half the money expended on them. I saw a well-written letter in the Journal some time since showing the amount that mines generally returned to the subscribers. This rather startled me; but when I carefully analysed the figures and remarks I found I could discover no sufficient error to warrant a contradiction; but I can do so when I analyse the reports on these Welsh mines, and their fabulous statements as to the profits, which generally wind-up with the oft-repeated tale of what Sir H. Myddelton made by mining.

I know a lead mine west of Liskeard, said to be a valuable dividend-paying one, selling at 43*l.* or 44*l.* per share, and not paying more than 3*l.* per year dividend. The way I should reckon this is—first, to take 2*l.* 10*s.* for interest, then the round sum of 10*s.* would remain to reduce the 43*l.*, the first outlay; the purchaser would have about eighty years to live to get back his money. Would any sane man purchase a mine in this way?

I say that, generally, scarcely a moiety of the money collected to work mines is spent on them; but if Welsh speculators were to see that all the money was really spent, and were to call in two practical and scientific inspectors to condemn all the mines which show little or no prospect of paying, and not be led away by what the Welsh miners say—that the prospects are good, because they saw a crack—then Welsh mines might rank co-equal with other mining property, and not before.

One of these knowing reporters said to me a short ago that he thought I knew ere this that the way to catch a good fish was to tie up an alluring bait. I now notice that one of these expert fishers has been trying this game on the banks of the Tavey, where he is said to have been very successful, but he has now gone to fish on the banks of the Tamar with a silver fish as a bait. I have not heard if he has succeeded as well as Malachy did, who caught a coach and pair of greys, but they proved to be wind-broken, and did not last, for one dirty day, in passing near Harrowbear, they got stuck in the mire, from which he could not extricate them.

I will now just analyse some of the Welsh mines, to see how their accounts stand; but I may mention that the Messrs. Taylor and Co. have of late years worked very skilfully in mining, and appear to have carried off much of the cow's cream from the Welsh mines in the before-named counties, leaving the Welsh only the goats and sheep to milk, which just serves for their own use, but is not sufficient to stimulate them to bring out a second Sir H. Myddelton, who may be compared to old Mr. Williams, of Cornwall, who picked nearly all the outer raisins from the pudding, leaving little but the dough for the later comers.

When I first went into Wales the Messrs. Taylor were in possession of Cwmystwith, the Lisburne Mines, and Goginan; the latter paid in early days, but not lately. Since my attention was first called to Welsh mines, or I might say since the first publishing of the *Mining Journal*, I never knew above six dividend-paying mines at one time shown in the Dividend List—that is of those worked by public companies. I will take the following as they are found, and submit them as an example, according to my views, of the result of mining in the two counties:—

CWMYSTWITH—128 shares.

Received by dividends	£385				
Calls paid	£60	£130	= £255	× 128	= £ 32,640
Interest, 20 years, at 6 per cent., say	70				

LISBURNE MINES—400 shares.

Received by dividends	£515				
Calls paid	£19	£40	= £475	× 400	= £190,000
Interest, 20 years, at 6 per cent.	21				

EAST DARREN—300 shares.

Received by dividends	£166				
Calls paid	£32	£56	= £110	× 300	= £ 33,000
Interest, 12 years, at 6 per cent.	24				

CWM ERFIN—867 shares.

Received by dividends	£ 30½				
Calls paid	£ 7½	£ 13	= £17½	× 867	= £ 15,172
Interest, 12 years, at 6 per cent.	5½				

Profit £270,812

My advice to those who wish to embark in mining is to look to the tin mines of Cornwall, where, with the present prices of tin, they have a far better chance than in some other districts I could name. N. ENNOR.

St. Teath, Cornwall.

MINING IN CORNWALL AND WALES.

THE MARAZION DISTRICT.—Having paid a visit to this about Christmas last, I was induced at that time to send you my impressions of the mine opening out between Goldsithney and Marazion, by Mr. A. Bennett and the Messrs. Gundry. I then stated I had no doubt of their soon entering into a good course of copper ore, and these predictions have been verified to the letter, as they have discovered in the winze in the deepest part of the mine a very rich course of copper ore. I also examined the North Neptune, which the proprietors of the ground, the Messrs. Laity, have advertised as the "Gears" St. Hilary, and for which they are willing to negociate for the working on the most reasonable terms both as to price for the work accomplished, materials on the grant, and the dues or royalty. I am confident that with 2000*l.* rightly expended on this property it would become one of the richest mines ever opened in the western part of Cornwall.

CARDIGANSHIRE.—A very important discovery has been made at the Caenant and Pen Craig Du Mines, situate to the east of Goginan and Bwich Consols. Some time ago a new lode was found at the latter mine, from which all their present returns are being made, not far from the boundary between them and Caenant Mine. This lode has been found at surface, yielding about 5 cwts. per fathom, and is opening out, so that a depth of only 6 fa. under it yields 15 cwts. of solid lead per fathom, and I have no doubt it will continue to open out until it yields from 3 to 5 tons per fathom, the general produce of this lode when found to be rich. These mines were recently offered for 3200*l.*, but this great discovery enhances their value many thousands of pounds. Most of the poorer mines of this county are looking better than they have ever done, and, as we may expect a better price for lead as the war proceeds, we may reasonably hope for better dividends from them. ABSALOM FRANCIS.

Goginan, July 20.

THE TERRAS TIN MINE, AND ITS MANAGEMENT.

SIR,—In answer to "L. H.," in the Journal of last week, I think myself, had I foreseen the difficulties I have had to contend with in getting competent carpenters, tin-dressers, and workmen in general in numbers sufficient for the work, I should not have started the engine quite so soon as I did; but I had promised it should be ready to start—it was ready, so, according to my promise, I started it with confidence at the time I could get the floors ready. As for stopping for two weeks, I am glad to inform "L. H." that we shall do no such thing. We shall stop for two or three days, in order to put down larger pumps, as those now in use are too small to give sufficient water for the dressing purposes, and we shall be able to complete our dressing-floors and machinery without stopping the engine. We already have three round buddles admirably at work, and other machinery in course of completion, sufficient to take the tinstuff from the stamps now erected. Yet with all our difficulties, and perhaps they are not more than many other entirely new works have to contend with, can "L. H." inform me if during his leisure hours he has seen any other works in the kingdom with the same amount of merchantable tin than Terras has? We commenced at surface with every matter and thing new to provide and erect, not having even the old trial pits to work in, they having been filled, or nearly so, with rubbish. We now have the shallow short level "L. H." speaks of through to the pit named by him, being the bottom of the former workings; here the stone is producing much better for tin. The staff of workmen have much improved in the last few days, and we are getting in a position to clean all the tinstuff as it comes from the stopes. Suppose we do not get all cleaned up directly, and we cannot, it is only like the gold bars lying in the mint waiting to be coined. I am well aware, and deeply regret, the waste "L. H." mentions; still I know how to remedy it, and shall do so. There are scarcely two tin mines that it will answer to treat the tin exactly in the same way, and we have been giving that department a due portion of attention. Tin-dressers think they must do as they have done before, which will not always answer. As to slime-pits, we have one pit now ready, and shall have more as soon as possible, as I realise the importance of them.

I will take this opportunity to inform those interested, through your widely-circulating Journal, that in consequence of not being able to get the dressing-floors, &c., ready, we started but 32 heads of stamps; the 48 are ready, and we shall start them in about ten days: they will produce from 5 to 6 tons of merchantable tin per month. —— JOHN EDWARDS, Resident Agent.

QUEEN SILVER MINE.

SIR,—A few lines from an eye-witness, to a fact no less strange than true, may not be unacceptable to your readers Some few months ago I was strongly advised by a friend to take a considerable interest in the Queen Silver and Copper Mining Company, then being started. This advice was given on the strength of the silver found in the sett of the company, some of which had already been sent to market. I had the most perfect belief in my friend's sincerity in the matter, but I had no faith—not even as a grain of mustard seed—in English silver—*i.e.*, in anything like paying quantity. The event, however, has proved that my friend was right, and I was wrong. I may observe in passing that I *did* take a small interest in the mine, partly in consideration of the copper (of which several lodes, *already proved*, are in the sett), and partly out of good fellowship with my friend. But to the point—a few days since I was at this gentleman's house, when news was brought from the captain that the silver lode had enormously improved. We at once drove over to the mine to satisfy ourselves as to the accuracy of the captain's statements. I frankly confess all my old scepticism with regard to silver in England was completely and at once put to flight by the sight which met our eyes. Large masses of silver ore, of various qualities, but all more or less rich, varying from 25 to 75 per cent. of their own weight, were lying awaiting our inspection, while the lode itself presented every indication of further improvement. The agent is a quiet, undemonstrative, cool-headed man, of lengthened experience in silver mining, and a clever assayer. With an evident determination to keep within bounds, and not to yield to sanguine expectations, and at the same time comparing the present produce of the lode with that already from time to time sold to the smelters, he valued it at from 500*l.* to 600*l.* per fm. From his manifest modesty I have no doubt his private estimate placed it at a much higher figure.

I take it here is a discovery that must wake up the mining world. We hear of lodes in some few foreign gold mines worth 200*l.* per fm., and they deservedly make a sensation; but here, at home, within a day's ride from London, is a mine with a lode of a precious metal of three times that value. And to think that our eyes have been so long blinded to the existence of such lodes in our own land! But this circumstance, I am inclined to think, must be due to the unattractive and somewhat insignificant appearance of these lodes where visible, which has caused them to be passed over in the search for other minerals. It is, however, a true and a pithy saying, "There's as good fish in the sea as ever came out," and now that I have perforce got rid of my scepticism, it is my firm belief that similar lodes are to be found if carefully sought for. In addition to this rich silver lode, the "Queen" has five or six copper lodes, *all proved*, which the agent affirms will, without the slightest difficulty, soon return 500 tons of ore of good quality per month.

I fear East Lovell will now begin to tremble for its laurels, and that the Queen must be the sensational mine for the next twelvemonth at least. It is said "There is nothing new under the sun." Silver was undoubtedly produced in this country in the earlier ages of our history, but in latter times has been lost sight of. I sincerely hope that this opportune discovery will open up a fresh field for enterprise, and that the Queen herself will have the honour of heading a train of prosperous and wealthy relatives.—*Dartmouth.* VERAX.

[For remainder of Original Correspondence see to-day's Journal.]

FOREIGN MINING AND METALLURGY.

The past few days have been a rather quiet period in the Haute-Marne district. Merchants' iron has only given rise to a few affairs, and the orders which have reached the foundries are far from being so important as for some time past. Pig, iron wire, and machine iron still meet, however, with a sustained enquiry. The slackening observable in affairs has not, however, brought with it any decline in quotations; on the contrary, the prices of all articles are generally firm, and some even display an upward tendency, in consequence of the interruption which producers have sustained by reason of the drought. There is not much to report as to the markets of the Moselle and the Meuse; the forges of these groups maintain the favourable appearance which has been observed upon them for some time past. Rough refining pig is dealt in by continuation in the Moselle at 2*l.* 17*s.* 6*d.* to 2*l.* 19*s.* 2*d.* per ton, according to the works, the marks, and the periods of the delivery. It is stated that the house of Wendel, whose production is much restricted, in consequence of the stoppage of the blast-furnaces, has just renewed its contract arrangements with an establishment in the Haute-Moselle. The Ottange Works are about to extend their production of pipes. The advices which come to hand from the forges of the Nord are rather less satisfactory than those received from the Moselle; orders for iron do not make default, but there can scarcely be said to be an abundance of them. Prices remain well sustained, notwithstanding that some concessions have been made to Parisian iron merchants. The new forge of M. de Dorlodot has four double furnaces in activity; it sells part of its rough iron in the district. A rolling mill is being constructed for MM. Hondart, Marnois, and Cornez. The Hamoir Company has twelve more furnaces in operation than for some time past. A great furnace at Anzin does not appear to be yet ready to be lighted. The dearness of labour is a subject of some complaints; thus wages have risen during the past year to the extent of about 18 per cent. The operative metallurgists of the Rive-de-Gier district have, nevertheless, demanded an advance of wages to the extent of 5*d.* per day, in consequence of the dearness of provisions; they also required that over time should be paid for at double the ordinary rate. More than 800 working mechanics at Rouen are not exactly on strike, but they are asking that the working day should be reduced to ten hours, without a corresponding reduction in wages.

The Belgian coal trade continues in an excellent state. Orders are abundant, and prices are firm. The directors of the Belgian State Railways have let contracts for 3000 tons of Bessemer steel rails, to be delivered in the course of 1871. A considerable number of tenders were sent in, the terms of the contract having been advantageously modified as regards the period allowed for delivery, the *cautionnement* to be deposited, and the guarantee to be given. The 3000 tons were divided into three lots of 1000 tons each; MM. Adhemar Le Roy and Co. secured one lot at 11*l.* 11*s.* 9*d.* per ton, and another lot at 11*l.* 14*s.* 2*d.* Mr. J. W. S. Jackson, of Paris, secured the third lot at 11*l.* 12*s.* per ton. Messrs. Cammell and Co., of Sheffield, tendered for one lot at 11*l.* 11*s.* 9*d.* per ton, with delivery at Antwerp. Mr. Jackson's tender provided for delivery at Mons. Messrs. J. Brown and Co., of Sheffield, tendered for the three lots at 12*l.* 16*s.* per ton, with delivery at Antwerp. Messrs. Schneider and Co., of Creusot, tendered for one lot at 11*l.* 12*s.* per ton, but their offer contained an inadmissible clause; they required that the rails agreed to be supplied should be tried at their own works; this stipulation led at once to the rejection of Messrs. Schneider's proposals. The current of orders received upon the Belgian markets continues good, and several large contracts are stated to be in course of negociation, especially for German railways. Various obstacles oppose, however, the definite conclusion of these contracts. The works producing rails are still furnished with orders for some months in advance, and as the execution of the contracts now offered is required within a brief period it is rather difficult to undertake them. Besides, the conditions of payment are not of the most favourable character; thus, it is proposed to pay in paper, or at very remote dates. In the present uncertainty of affairs the proprietors of the Belgian works can scarcely be blamed for showing a certain hesitation, and declining to undertake affairs which they consider not fully guaranteed. In the Charlerol basin merchants' iron in bars is worth 6*l.* 12*s.* per ton for No. 1 first-class, with a scale of 12*s.* per ton per class; hoop iron is worth 8*l.* 16*s.* to 9*l.* 4*s.* and per number. Plates for construction purposes are worth 8*l.* 16*s.* to 9*l.* 4*s.* per ton. An additional quantity of iron sleepers is understood to have been ordered for the Belgian State railways; last year MM. Legrand and Salkin, of Mons, supplied the system with 500 iron sleepers by way of experiment, and the order now given out has gone into the hands of the same firm. Some of the sleepers ordered have already been delivered.

In order to enable it to keep pace with its continually extending traffic, the South Austrian and Upper Italy Railway has given out orders for 52 locomotives—one per week—to be delivered in the course of the current year. The stock of engines will thus be increased to 1096. The St. Leonard Company, at Liége, will commence the payment on the 1st prox. of a dividend of 2*l.* per share for 1869-70.

AUSTRIAN IMPORTS OF IRON.—The importation of iron into Austria has increased considerably since the abolition of the former protective duties. While the prohibitive system, which was set aside by

the Austro-German commercial treaty in 1866, still maintained its ground, iron could not be imported into that monarchy without a special licence from the authorities, and consequently but small quantities of this article were sent across the frontier. The importation of all kinds of raw iron amounted in 1867 to 321,335 centners; in 1868 to 2,688,708 centners; and in 1869 to 3,256,400 centners. In 1867 there were imported into the empire 508 centners iron rails for railways; in 1868, 1,084,375 centners; and in 1869, 2,287,089 centners. In the same years Austria imported 31,449 centners, 257,479 centners, and 369,375 centners tinned sheet iron; and of iron in other forms 3565 centners, 194,806 centners, and 390,890 centners respectively. The importation of hardware amounted in 1867 to 41,134 centners, in 1868 to 148,434 centners, and in 1869 to 531,438 centners.

TESTIMONIAL TO PROFESSOR MORRIS, F.G.S.

A meeting of nearly one hundred gentlemen, occupying prominent positions in connection with geology and the allied sciences, was held at the rooms of the Geological Society, Somerset House, on July 14,

Sir RODERICK I. MURCHISON, Bart., K.C.B., in the chair.

The CHAIRMAN, in opening the business of the day, expressed the sincere gratification he experienced in having been requested by the subscribers to this Testimonial to act as Chairman on an occasion when it was sought to do honour to Prof. Morris, whom he highly esteemed as a geologist, and whom he loved as a friend. He then gave a sketch of the career of Prof. Morris as a geologist, showing that in his earlier researches he was among the first to make most valuable communications upon the structure and fossil contents of the Tertiary formation of the South and East of England; and how he next threw much new light upon various members of the Oolitic formation and the Lias, describing the fossil contents with great acumen and ability. These were followed by his *opus magnum*, the "Catalogue of all British Fossils," which had duly gone through two editions, and was a work which would forever hold a high place in science, as a truthful record of the succession of all classes of known animals, from the earliest traces of life to those of the youngest Tertiary formations, and connect ancient with existing nature. Sir Roderick then dwelt upon the various acquirements of Prof. Morris besides those of geology and palæontology, particularly mineralogy, observing that he was one of the few geologists who was well acquainted with the forms of all simple minerals. Sir Roderick then touched upon the great services rendered to himself by Prof. Morris, in the years 1853 and 1854, when they travelled together in Germany; and, lastly, congratulated all present on having taken part in so just a cause as the presentation of a Testimonial to so distinguished a scientific labourer, whose chief merits had been admirably delineated, in the most appropriate language, by Prof. J. Phillips, of Oxford, as recorded in the Address, which he (the Chairman) had signed with so much satisfaction, rejoicing that he, as the oldest of the Presidents of the Geological Society now living, should be associated with such other Presidents as Phillips, Warington Smyth, and Prestwich, the two last being present at the meeting:—

To JOHN MORRIS, Esq., F.G.S., Professor of Geology in University College, London.

We, the undersigned, FRIENDS AND CULTIVATORS OF GEOLOGY, taking into consideration the degree in which this science has been advanced by your long and successful labours, are desirous of offering to you a TESTIMONIAL of the high estimation in which they are held. Always working in the field, and classifying public and private collections, you have for many years been among the foremost and most diligent of the STUDENTS of Geology and Palæontology; your careful publications have their place among those of the MASTERS in every geological library; and your thoughtful lectures live, and will live, in the minds of your SCHOLARS. We shall be happy if by this testimonial you may be encouraged to persevere in a course alike honourable to yourself and advantageous to the public, and that it may be pleasant for you in future years to remember that among the names to be submitted to you are many of those who have known and shared and been instructed by your labours.

"*Forsan et hæc olim meminisse juvabit.*"

Before presenting this document, which was "Signed on behalf of the Committee" by himself; Mr. Prestwich, the actual President of the Geological Society (to whom Sir Roderick specially alluded); Mr. Alfred Tylor, whom all geologists knew; and Mr. William Milnes, F.G.S., the treasurer; and countersigned by Mr. Hearn, to whom was mainly due the success which had attended the carrying out of the Testimonial, he would call upon Mr. Prestwich for a few remarks.

Mr. PRESTWICH said: It is with great pleasure that I respond to the call of Sir R. Murchison, and express my cordial agreement in all he has said respecting my old and valued friend Prof. Morris. I have known him now some 35 years, and I can truly say that a more earnest geologist, and one more ready to impart to others the great and varied information he himself possesses, there cannot exist. His aim has ever been to spread a knowledge of that science which he has cultivated with so much pleasure and so much success. Often, too, regardless of other considerations his first object has always been the free, and, if possible, the gratuitous diffusion of geological science—possibly too much so. Still, if he has failed often to secure his reward in £ s. d. he has always secured the respect, esteem, and affection of his friends, and of all with whom he has worked. With most men the prospect of a good fee would be an incitation to work, but with my good friend Morris the surest way, I believe, to get him to work was too often to say that no fee or remuneration would attach to it. His first introduction years ago was by a valued mutual friend, Mr. Teesdale, who suggested that a work on the Tertiary Geology of the London Basin was needed, and he thought that Prof. Morris might undertake the Palæontological and I the stratigraphical part. I am inclined to believe that Mr. Morris must have considered the work as likely possibly to be remunerative as, though taken up warmly at the time, the first chapter still remains unwritten. This Testimonial is, I feel, but a small earnest of our feelings towards Prof. Morris. For the opportunity thus afforded of expressing our good wishes towards our friend, we have to thank the *Mining Journal* for the publicity it has given to the matter, and for an active part in the management we are, I believe, indebted to Mr. Hearn, whilst Mr. Milnes has kindly acted as treasurer for the fund, which for Prof. Morris's sake I only wish had been doubled.

Sir RODERICK then presented the address in a frame to Prof. Morris, with an envelope containing a certificate of Great Indian Peninsula Guaranteed Stock and bank notes, and stated that the balance (619*l.* 14s. 6d. being the total amount collected) would remain with Mr. Milnes, at Prof. Morris's disposal, adding that he would have liked to have been able to record that the sum was much larger, at the same time expressing his belief that the words of truthful eulogy employed in the address on vellum would be infinitely more appreciated by his eminent friend than any offering in money.

Every sentence of Sir Roderick's speech was warmly applauded.

Prof. MORRIS, in rising to reply, said—Sir Roderick Murchison, and Gentlemen: It is with deep and sincere feeling that I thank you and the members of the Geological Society, and other friends, for the handsome Testimonial which I have received at your hands this day. I not only thank you for the kind manner with which you have expressed yourself, but I recall with pleasure the encouragement to pursue my labours you gave me more than 25 years since from that chair, when President of the society, in 1842, and still more so when in after years, and after two geological excursions on the Continent, in 1853-4, you kindly asked me to be your companion. Your kind suggestion induced me, and your strong recommendation placed me in the position I now hold at University College, the duties of which during the last 15 years I have earnestly endeavoured to fulfil, so that I trust you have had no cause to regret the confidence you then placed in me. Nor, Sir, on the present occasion must I forget to thank one of my warmest and most sincere friends, the President of the Geological Society, Mr. Prestwich, whose companion it was my pleasure and privilege to have been during his earlier researches among the Tertiary strata of England and the Continent, and upon the geology of which he is so well-known an authority. To his kind sympathy and counsels I have been largely indebted, and upon which counsels if I had always acted I must frankly say I might this day have been a better and a wiser man. Nor, Sir, can I overlook the language in which this Testimonial is expressed without feeling, as I am given to understand, it is from the pen of one (Prof. J. Phillips) of whom it may be said *nihil tetigit quod non ornavit*, whose philosophical writings are well known to most of us, and whose kindly feelings towards myself has culminated in the manner in which, Sir Roderick and gentlemen, he has expressed your favourable estimate of my labours and endeavours, both publicly and privately, in the cause of geological science. In conclusion, Sir, I must again thank you most sincerely for presiding on this occasion, considering the many demands upon your valuable time, and for the genial warmth and kindliness of manner with which you have conveyed your sentiments towards me. I again thank the present President of the Society, and also the numerous friends, among whom I may mention Mr. W. Milnes and other members of the Coal Exchange, whose names have been submitted to me, and who have advocated this valuable recognition of my services. The Testimonial, supported as it is by so many influential names, I shall prize most highly as the result of so much sympathy from a constantly increasing circle of friends, while at the same time I hope it will stimulate me to increase my exertions for the progress of that science to which the best, and I may say the happiest, years of my life have been devoted.

Mr. HEARN was sure the meeting would be unanimous in offering their best thanks to Sir Roderick Murchison for having presided and presented the Testimonial. They must all appreciate the fact that whatever might be the value to Professor Morris of the Testimonial, whether for the kindly feelings it conveyed or otherwise, that value was considerably increased by Sir Roderick having personally made the presentation; and he was entitled to their thanks, not only for presiding that day, but for his exertions generally in connection with the matter, for he could assure them that Sir Roderick had been one of the hardest workers on the committee.

Prof. TENNANT seconded the motion, which was carried with acclamation, and appropriately acknowledged by Sir Roderick.

Mr. PRESTWICH, before the meeting separated, said he was sure they would all be glad to hear that a letter had just been received from Prof. Sedgwick, dated that morning. It was addressed to Mr. Hearn, and said—

"The infirmities of old age make it impossible for me to attend the public meeting at the rooms of the Geological Society. This is to me a great sorrow, for no one can value Prof. Morris's most laborious and most useful palæontological works at a higher price than I have done. And I honour him not merely as a man of science but also as a kind personal friend, who has for many years taken his place in the first rank of practical English geologists. Pray present to him my heartfelt congratulations, which the load of 85 years, and a great infirmity of sight and hearing, will prevent me from offering personally."

The meeting then separated.

TWO DAYS IN A MINING DISTRICT.

BY LOGAN LOBLEY, ESQ., F.G.S.

Having received an invitation from a gentleman connected with the mining interest to visit with him the copper and tin mining district of East Cornwall, I gladly availed myself of my friend's offer to show me a little-visited though highly important district, and to give me a glimpse of the underground life of a not inconsiderable section of our industrial population. Accordingly, in due time I found myself at Devonport, from which place steamers run up the River Tamar to Calstock, a small town on the Cornish side of the river, where the ore obtained from the many neighbouring mines is shipped. This little Cornish town is, accordingly, the port as well as the capital, as it were, of the district about to be described, and Calstock, therefore, was our destination and the place at which we were to sleep. And here I should have been tempted to say a few words about the three towns—Plymouth, Stonehouse, and Devonport—for their characteristics and surroundings are in many respects remarkable, but as they are not in our mining district I must pass on. It would, however, be unpardonable were I to pass over without notice the beautiful scenery of the River Tamar; for the glassy smoothness of the water, reflecting the sunlight of a lovely afternoon, the dark masses of the woods which richly clothe the boldly swelling hills on either side, as well as the variety of views consequent upon the numerous windings of the river, have left a very vivid impression of exquisitely soft and beautiful river scenery. The great sleepy looking hulls of the men-o'-war lying up in ordinary on the broad bosom of Hamoaze, the remarkable bridge at Saltash, "the meeting of the waters" of the Tamar and Tavy, and the beautiful domain of Pentilly, are successively passed: and we see in the distance the summit of Kit Hill in Cornwall, and the Tors of Dartmoor in Devonshire. These hills are granitic, and it is near and in the granite that the metalliferous veins or lodes occur; but engine-houses perched on eminences are a further indication to us of our approach to a mining district, and in a little time the numerous buildings of the Devon Great Consols Mine, said to be the largest copper mine in the world, are seen on a noble hill which closes up the view to the north. One of the mines passed is abandoned, in consequence of the river some years since having broken into the workings, which extended beneath its bed.

We left the steamer at Clothele, a landing place some little distance below Calstock, in order to examine some strata near, as well as to enjoy the beautiful walk through the woods which lie between this place and Calstock. This romantic walk passes the front of Clothele House, a seat of the Earl of Mount-Edgecumbe, and one of the most charmingly picturesque mansions of the Tudor period that can well be imagined. All the surroundings, too, are in keeping, no modern "improvements" having been allowed to detract from the quaint and antique character of this fine old place, but there it stands as it did 300 years ago, with its many gables, its porches, its oriel windows, its terraces, its antique gardens and clipped yew hedges, and its old orchards mingling with the thick woods around, a very type of the home of the fine old English gentleman of the days that are gone. We descended by a winding path, and crossed a deep valley called Danes Comb, from having been used as a place of embarkation by the old sea kings when they held much of the interior. The inhabitants of the district, even to the present day, have a tradition that pots of gold and silver, buried in this valley, lie left after the precipitous flight of the Danes to their ships when they suffered their last defeat under Hengist and Horsa.

It was now dusk, and we hastened to Calstock, where we were to take up our quarters for the night. There two superintendents of neighbouring mines awaited our arrival, and as these gentlemen were anxious to afford every possible information respecting the district and mining operations generally, a very agreeable and instructive evening was spent at the little Cornish inn by the side of the Tamar.

On the following morning a pleasant walk along the river bank of half a mile brought us to the Okel Tor Copper Mine, an exceedingly good mine to visit, since it is one of average size, and in full working order. This mine is, moreover, very well planned and arranged, and the aboveground works are compact and in good condition. As we intended to spend the day in visiting various mines, and getting a general idea of their distribution, as well as of the prominent features of the district, the descent into the mine, which occupies much time, was postponed until the following day. The process of dressing the ore was, however, going on briskly; there was, therefore, sufficient to interest us aboveground. The material brought to the surface, the result of the mining operations underground, is not, as some might suppose, altogether copper ore, but a mixture of the ore, or sulphide of copper, with mundic, quartz, fluor-spar, and various earthy matters. It becomes, therefore, requisite to separate the ore from these other substances, and so minimise the bulk before shipment, the smelting or reduction of the ore to metallic or commercial copper not being carried on here. This process is called dressing, and employs a considerable number of people about the mouth of the mine. The stuff on being brought up is a yellowish grey aggregation of stones of all sizes and coarse mud, and it is in the first place necessary that the whole should be brought to the condition of coarse powder. The stones are first separated from the rest of the mass by means of a screen, and after being washed they are looked over, and the worthless ones, or those without ore, quickly detected by the practised eyes of the workpeople, rejected, while those containing ore are passed on to other workers, who, with peculiar shaped hammers, break them into smaller pieces, and the non-metalliferous portions are cast aside. By these operations a large quantity of worthless material is got rid of, and the stones are reduced to the size of apples and walnuts. These stones are now taken to the crushing-mill, where they are reduced to a coarse powder; this being added to the small stuff which passed through the screen, the whole is then taken to the jigging machinery. The jigging is a very peculiar process, and has the effect of separating the ore from the small pieces of quartz and other substances with which it is yet intermingled. An oblong trough, about 4 ft. long, 18 in. broad, and 1 ft. deep, fitted with a perforated bottom, is suspended by a rod of iron from one end of a long lever, and lies in another and larger trough, through which a stream of water is constantly running. The first-mentioned trough is almost filled with the crushed material, and then quickly shaken or jigged by means of the lever, while the stream of water is passing through the trough and mingling with its contents. In a little time it will be found that the ore, in consequence of its superior specific gravity, is at the bottom of the trough, while clean quartz, mundic, and fluor-spar form a distinct layer above, and the earthy or clayey matter has all passed away with the water. The upper or worthless portion of the contents of the trough is removed by means of an iron scraper, and the ore, thus freed from all extraneous matter, is then dried. This completes the dressing, and the ore is now ready for shipment to Swansea and other places to be smelted.

After leaving the Okel Tor Mine we traversed an ascending road for a long distance, passing the old seat of the Trelawny, the hero of the old Cornish song—

"And shall Trelawny die?
And shall Trelawny die?
Then twenty thousand Cornish men,
Will know the reason why."

The elevated village of Alberson was passed through, and then the Drake Walls Mine was quickly reached. This is a large tin mine, upwards of 200 men being employed here. The works aboveground are extensive; a more elaborate process for dressing the ore of tin being requisite than is necessary for that of copper. The dressing of tin ore, like that of copper, is, however, effected chiefly by crushing and washing, but the oxide of tin being usually associated with harder minerals than are found in conjunction with copper, the use of very powerful and elaborate stamping machinery is necessary for the reduction of the stones to powder. The washing, also, is repeated several times, and by the aid of very curious contrivances, since it is very difficult to entirely free the ore of tin from the particles of foreign matter of nearly the same specific gravity with which it is intermingled. Quartz and woolfram, or tungstate of iron, are the minerals most usually brought up with the oxide of tin, though a variety of other substances are sometimes associated with it.

Leaving Drake Walls, we rise to still higher ground, from which fine and extensive views of the valley of the Tamar are obtained, and mines on all sides give evidence of the abundant mineral treasures which lie beneath. Higher yet, and we at length come upon the open Moor, over which a glorious walk brought us to Kit's Hill, the highest land in East Cornwall. The downs over which we had passed are called Hingston Downs from Hengist, from whom the Danes received that last defeat, which caused their flight down the valley of Danes Coomb. These Danes were previously defeated by Horsa at a higher position on the Tamar, called Horse Bridge, a place which may be seen from Hingston Downs on looking northward. The lower part of Kit's Hill is composed of the prevailing rock of the district, the Lower Devonian, locally termed killas, and in this rock are found the copper-bearing lodes. Here, therefore, we have copper mines, but when the summit of the hill is reached we find ourselves on granite, and a large tin mine is there as witness to the remarkable fact of the association of tin with granite. The view from the top of Kit's Hill is most extensive, embracing the vales of the Tavy and Tamar, with the lonely hills of Dartmoor beyond, the whole of the south-east corner of Cornwall, with Liskeard and various villages nestling among the trees, the granitic hills which form, as it were, the backbone of Cornwall, and on the north a finely wooded and picturesque country stretches away to the horizon. Having visited several mines both of copper and tin, and observed the mode of dressing the ore of each metal, and having, moreover, traversed the district in such a way that the distribution of the mines as well as the prominent physical and geological features of the district had been well seen, we returned by a fine walk over moors and through woods down hill nearly the whole distance to Calstock, where we arrived well prepared to enjoy the excellent Cornish dinner which awaited us.

The next morning we prepared for the descent of Okel Tor Mine, which it is requisite to effect at an early hour that the gunpowder smoke, occasioned by the blasting going on throughout the day, may be as much as possible avoided. On arriving at the mine we were first directed to change our clothes for a complete miner's dress, and thus disguised, with candle in hand, we entered the opening to the mine. Each person entering the mine is furnished with a candle, having a mass of wet clay round it, by which it is securely held in the hand, or fastened to the front of the hat whenever it becomes necessary to have the hands free for descending and ascending the ladders. This mine is not, like a coal mine, descended by means of a bucket and rope, for although the ore is brought to bank by these means up the shaft of the mine, the miners and others use vertical ladders, securely fixed to the rock, and placed, not in the shaft up which the excavated material is brought, but in short shafts or winzes, which connect one level with another at various distances apart; so that after descending vertically a certain distance a horizontal gallery or level is traversed, and then another vertical descent is made, and so on until the bottom of the mine is reached. It must be clearly understood that, the metalliferous vein or lode running vertically through the rock, and coal occurring in horizontal layers or parallel strata, a metallic mine differs in its plan and arrangement very considerably from a coal mine; for while the workings or galleries of a coal mine are many of them on the same level, and have transverse passages all cut through the coal, which forms the walls of the passages, the workings of a copper mine are one under another, following the lode which forms the roof and floor of each gallery, the killas or rock forming the sides, when the lode is cleanly worked out.

In the Okel Tor Mine the workings or levels are excavated at regular distances of 15 fms. below each other, the first or highest level being 20 fms., or 120 feet, below the surface. The mine is not, however, entered by an immediate descent, as we first traverse a horizontal gallery called an adit, which enters the face of the hill. At the inner end of the adit we began to descend, using the vertical ladders. The ladders are very strongly made, and securely fastened by iron staples driven into the rock. No fear need, therefore, be entertained of the ladders slipping or shaking, and a firm yet not too tight grip of the iron rounds is all that is necessary to enable the descent to be made with perfect safety. Each ladder is not more than 30 ft. in length, and at the bottom of it a wooden stage is placed, from which the next descends. This arrangement affords both rest and security during the descent, and thus very great depths are ultimately reached without difficulty or danger. This method of descending, though somewhat laborious, has the advantage of enabling the visitor to obtain a much better idea of the depth of a mine, and of impressing him much more forcibly with the great amount of labour expended in obtaining from the earth its hidden mineral wealth, than is the case when a rapid descent is made in the ordinary way.

Under the guidance of the obliging manager we were taken to every interesting portion of the mine, and shown the mode of working out the lode, which is in some places several yards thick. Although this is not considered a wet mine a considerable quantity of water issues from the rock, and runs along the galleries. This, however, is by no means a disadvantage, as a receptacle is formed in which the water of the mine is collected, and then pumped to the surface, where it is used for dressing the ore, an operation requiring a large and constant supply of water. As in coal mines, tramways are laid on the floor of each level, and along these small wagons, filled with excavated material, are pushed to the bottom of the shaft. The height of the levels is everywhere such that an average sized man may walk upright with comfort, and the air is quite good, no noxious gases being perceptible to the senses. Accumulations of carbonic acid gas sometimes occur, but no explosive gases, such as produce the dreadful coal mine catastrophes, are ever met with. Copper mining is, therefore, a much less dangerous occupation than coal mining, and does not appear to affect injuriously the health of the men engaged in it. One robust old miner, working in the lowest level of the mine, told me he had been 40 years at Okel Tor, and he had never had any ill health. Indeed, it is considered by the men to be more pleasant in many respects than aboveground out-door work, as they are not exposed to the heat of the sun, suffer nothing from rain or wind, and in the winter the temperature below is uniformly high, since, in accordance with the well-known law that there is an increase of temperature of 1° Fahr. for every 85 ft. of descent below the surface of the earth, mines of all kinds are always warm, some, indeed, of very great depth are so warm that the miners are obliged to work with scarcely any clothing. Much of the lode is not difficult to work with the short picks in use, but often blasting is resorted to in order to remove large masses of killas, quartz, and the harder portions of the lode. After going to the extreme end of the lowest level we made our way to the bottom of the winze, and ascended to the level above, where other points of interest were shown to us, and explanations given by our excellent guide. Thus successively few portions of the mine were left unexplored, and at one time we were more than the height of the cross of St. Paul's, directly under the River Tamar.

On completing the ascent, and coming to the door of the adit, how glorious was the effect of the strong light of the bright sunny day! The woods on the opposite bank, and the brightly gleaming river below, seemed to have added to them a new beauty, an almost unearthly glory, since the eye had last seen them, so much had we become accustomed to the gloom and shade of the subterranean regions in which we had spent so long a time. Indeed, such a scene, beheld under such circumstances, tempts one to use the words Milton puts into the mouth of Adam when relating to Raphael his first experience of earth:—

"About me round I saw
Hill, dale, and shady woods and sunny plains,
And liquid lapse of murmuring streams; by them
Creatures that lived and moved, and walked or flew;
Birds on the branches warbling; all things smiled
With fragrance, and with joy my heart o'erflowed."

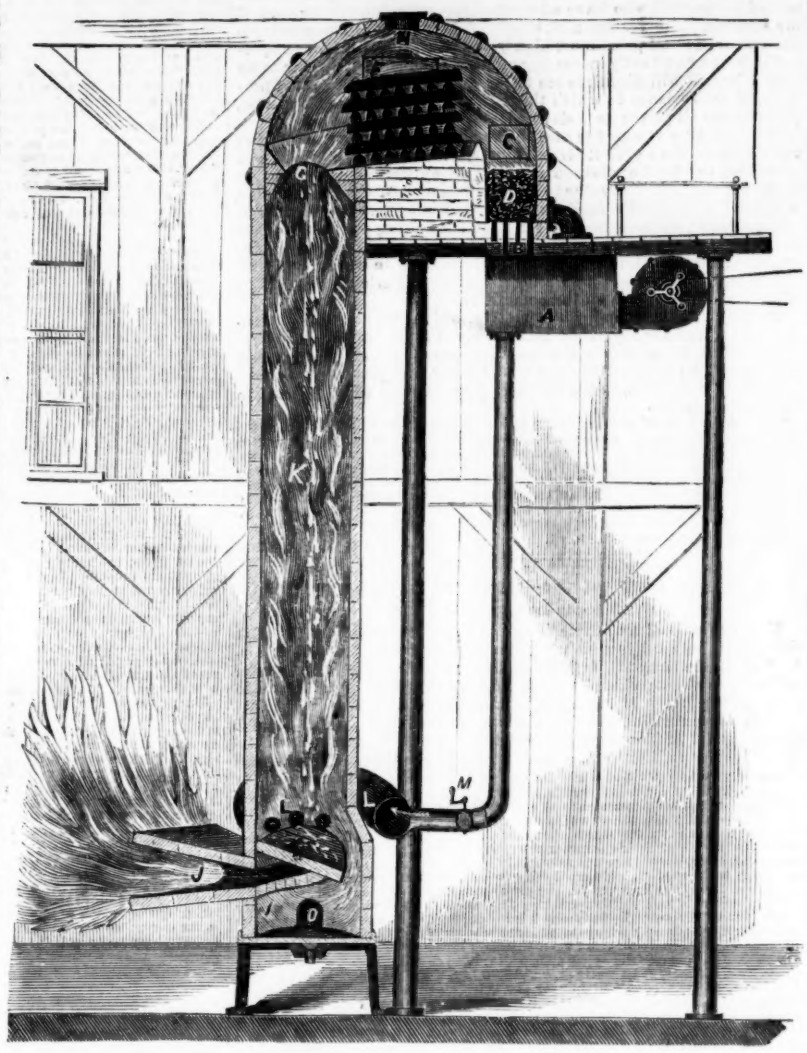
NEW PROCESS OF METAL CASTING.—A party of gentlemen, from London, Manchester, and other places, assembled at the works of the Lancashire Engineering and Compression Casting Company, St. Helen's Junction, on Saturday, to witness a new patent process of Casting Refractory Metals. The invention is of American origin, and has only recently been introduced into this country, where it will probably soon effect something like a revolution in the various kinds of work to which it is applicable. Besides possessing the sole right of making machinery for the whole process, the Lancashire Engineering Company have secured the first English licence to carry it on, including exclusive use for certain branches, such as the manufacture of articles connected with household furniture. It was chiefly in these branches—finger plates for doors and the like—that the experiments on Saturday were tried. The result was such as to show conclusively that by this new method exact castings of plain, chased, or elaborately embossed work can be produced in brass, iron, bronze, &c., without any skilled labour, after the production of one pattern. Hitherto the common loam moulds have only given out rough impressions, each of which, for all ornamented objects, required to be laboriously finished with delicate tools by trained workmen. This troublesome and costly work may now, however, be obviated with advantage. The *modus operandi* is exceedingly simple, albeit effective. In the first place, the pattern is placed on an oiled foundation plate, and besmeared with fine wet clay. It is then buried in a box with mixed clay and sand, which covering is pressed downwards until it assumes the consistency of an unbaked brick. In this state the clay cake is carefully removed from the box, turned upside down upon a table, and the pattern adroitly lifted from the bottom by means of a small gutta percha suction ball, leaving a distinct representation of itself in the vacuum so caused. After being sufficiently hardened in a stove, the moulds—for many can be operated upon at the same moment—are packed closely together in a large receptacle, which is made air tight. The fused metal is then poured from the crucible into an easily opened channel of this vessel, and forces itself into every crevice of the moulds, aided in its course by the action of a compressing machine. The moulds are next taken out into the open air, and broken with hammers, when there are found embedded in them a perfect *fac simile* in metal of the different objects originally used as patterns for casting. Even the most minute lines, such as may be seen in engravings or woodcuts, are clearly reproduced. The novelty has this further advantage, that one casting can be used to mould another without any need for the retention of the original pattern. Medallion making, type casting, and file making are said to be among the developments of the invention, to which much importance is attached, from the cost and toil hitherto attending these processes.

BRICKMAKING BY MACHINERY.—At a meeting of the Manchester Institute of Engineers Mr. J. F. M. POLLOCK (Pollock, Laing, and Powley, Leeds), read a paper "On Brickmaking by Machinery." The invention consists of powerful grinding rollers, pug mill, rotary moulding table of improved construction, and a press, the mould or moulds of which are independent of those in the table. A self-acting delivery belt, the driving apparatus of which is constructed on an improved principle, so as to avoid all possibility of slip, and a rotary brush, for removing any sharp corners or loose material from the bricks, are also added; and there is an improved system introduced for lubricating all sides of the moulds or bricks, in such a manner as to be independent in its operation of the attendant. The moving faces of the machine which have to work against the clay are all of steel, as also are the pug-mill, driving wheels, shaft, and knives. When common bricks are required, the press may then be thrown out of gear, and the machine may then be worked at an increased velocity. In concluding his paper, Mr. Pollock made reference to those who would hinder the introduction of machinery to supersede labour, and said the introduction of machinery had always created a demand a thousand-fold larger than the most sanguine ever looked for.

A NEW AMERICAN STATE.—The preliminary steps have been taken in Congress toward adding another—the thirty-eighth—State to the Union. A Bill has just been introduced in Congress to enable the territory of New Mexico to organise a Constitutional Convention, and take the other necessary steps for becoming a State. It is proposed that the new State shall be called "Lincoln," in honour of the late President. It contains 124,500 square miles of territory, and by the last census it had a population of 93,516, of which 10,538 were Indians. It is asserted that the Spaniards explored New Mexico as long ago as 1537, and that much of the gold and silver which they obtained while Mexico was under their dominion came from that region. Yet the mineral resources of New Mexico have never been developed to any great extent, even since it was acquired by the United States. Gold, silver, iron, lead, copper, coal, zinc, and salt have been found in quantities yielding profitable returns, and eminent geologists predict that ultimately New Mexico—or Lincoln—must become one of the richest mining States in the Union. At present the great drawbacks to the development of the mines are the sparseness of the white population and the presence of hostile Indians. The Navejoes, Apaches, Cheyennes, and Comanches infest the territory, and continually ravage and destroy the property of miners. Until they can be held in check it is almost hopeless to expect any great material development.—*New York Times.*

NEW PROCESS OF MANUFACTURING IRON AND STEEL.

An entirely novel form of furnace has just been invented by Mr. CHARLES PETERS, of Trenton, United States, which appears to combine several useful principles in the most simple manner. It may be said that at one operation the pigs are molten, granulated, and refined, or converted into steel, according to circumstances. The arrangement consists essentially of a small reverberatory furnace at the top of a narrow cupola. As the iron is melted in the former it falls in granules through the latter, where it is acted upon by the air which enters by the tuyeres at the bottom end. It will readily be understood that whilst in the cupola the iron is in the best possible condition to be acted upon, and that a single furnace does the entire work. The amount of manual labour required with the new furnace is merely nominal; and, as the cost of constructing one capable of melting and converting 2 tons of metal per day is estimated at 100*l.* only, and one that will melt and convert 5 tons twice a day less than 600*l.*, it is likely at least to be fairly tested, whilst the fact of the inventor being a practical ironmaster of long experience promises well for its practical utility.



In the above diagram, for which we are indebted to the *Scientific American*, a vertical section of the furnace is shown, the blast enters the air-chamber, A, under the scaffold, and passing upward through tuyeres, B, to the fuel—anthracite or bituminous—which is supplied through the small door, C, into the fire-box, D, passes from thence to the dome of the furnace, the flame playing upon the pig-iron, which is piled upon the bed or hearth, E, and which is introduced through the large door, F. The vertical part of the furnace is contracted at the top, G, so as to retard the exit of the flame at that point, and the products of combustion pass down on to the platform, H, which may be supported from the bottom, or from projecting brick from the sides. The platform, H, is composed of fire-brick, or any incombustible material; and the products of combustion then pass on into and through the reservoir, I, and finally escape at J. The reservoir, I, having thus attained, after a time, intense heat, is now ready to receive the molten iron as it falls in globules, K, from the top of the furnace or stack, through the flame and on to the platform, H, previously described. The concussion causes them to burst upon the platform, liberating all the free carbon and all the gas or sulphur contained therein, and thereby increasing the density of the metal. A blast through the tuyeres, L, is caused to play upon the iron, while thus in a finely divided state, similar in form to scales. This supply of oxygen brought in contact with the particles of iron completely decarburises it, and also frees it from any remaining sulphur or other impurities. Also the unconsumed carbon from the fuel above is supplied with oxygen at this point, and consumed, producing intense heat. It will be observed that each particle of iron is, without coming in contact with the fuel, exposed to the flame and blast, and undergoes a self-puddling process by falling from a height of 15 ft. or more. Manganese and charcoal are placed in the reservoir, I, for the purpose of a final fluxing and re-carburising, as may be desired. By turning the blast off with the damper, M, in the lower tuyeres, L, all the advantages of the reverberatory furnace are secured, while purer and stronger iron is obtained for ordinary foundry purposes, where clean castings are essential, with the additional advantages of the puddling process. The escaping flame may be utilised by leading it under a boiler, or for other purposes. The opening at the top of the arch, N, is for letting off the smoke when starting the fire, and to be closed with a cover of fire-brick while melting. The bottom of the reservoir, I, may be constructed with a drop bottom, like the ordinary cupola, for the purpose of repairs, &c. The metal is drawn off at O, into ingots. It will be seen that the area of the puddling platform, H, can be increased if desirable. If crucibles are used for pouring the metal, they can be heated to any degree by placing them in the flue at the escaping point, J, of the flame, by arranging a small door at that point in the side.

The cost per ton for treating the metal according to the new system is not stated, and it is probably upon this that the permanent success of the invention will depend. The cleanliness of the castings made from the iron is said to be all that could be wished. The granulation of the iron was found at the time of the introduction of the Uchatius process to afford great facilities for the conversion of iron into steel, but there was some loss in economy from the necessity of re-heating the granules before the flux could be added. In Mr. Peters's arrangement this is entirely avoided, by arranging for the introduction of the flux whilst the metal is still hot, so that the advantages and economy are combined. There would, indeed, be nothing to prevent the blowing in of finely-divided manganese compounds, or carburetting material, through the lower tuyeres, so as to bring the flux into contact with the granules even before they reach the platform. We shall be glad to record the successful trial of the process in this country.

SIX-WAY TAP FOR GAS AND WATER MAINS.

Messrs. CLAYTON, SON, and Co., of Providence Iron Works, Hunslet, near Leeds, have recently patented (through Messrs. Robertson, Brooman, and Co., of Fleet-street, London) an improved Six-Way Tap for Gas and Water Mains. The accompanying engravings represent the tap as applied to gas purifiers, to which the inventors intend chiefly to introduce it. The barrel in which the plug is placed is formed of six branches, two of which form the inlet and the outlet passages, the other four being for guiding the gas, when used in gas works, into and out of the purifiers. The plug is composed of top and bottom discs, connected by thin division plates; one side of each of the plates has other plates at right angles thereto, which fill the spaces between any two of the openings at which they may be placed, and form bearing surfaces for the plug to work upon and to make the same gas-tight. The patentees propose to employ only one tap for every two purifiers, and any one two, three, or all four purifiers of a set can be shut off for the purposes of cleaning or for repairs.

FIG. 1

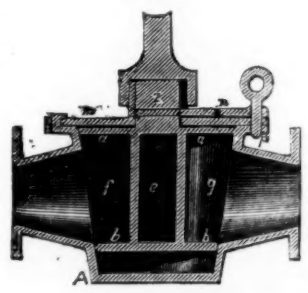


FIG. 2

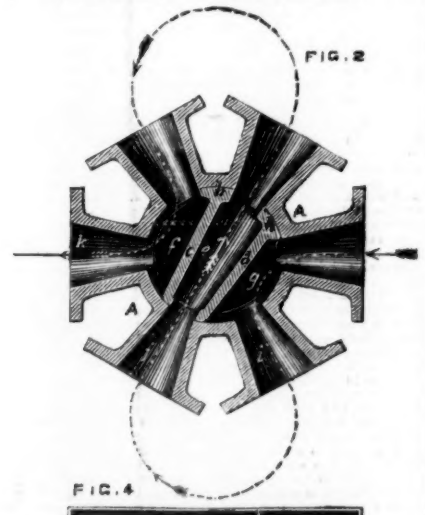


FIG. 3

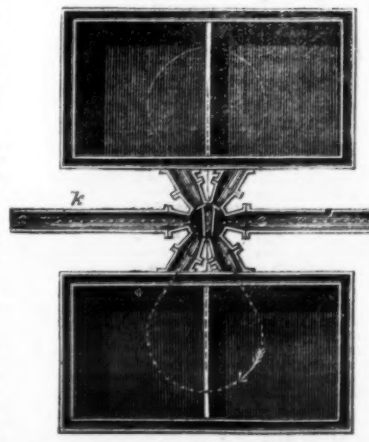


FIG. 4

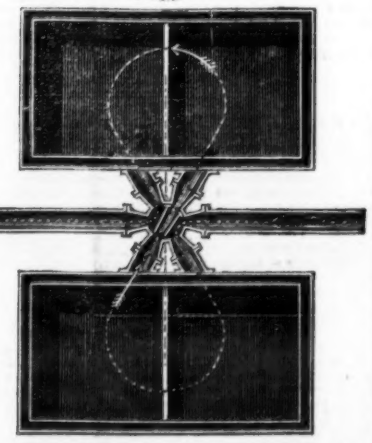


Fig. 1 is a longitudinal section of a plug fitted in a barrel. The plug is composed of top and bottom discs or plates, *a b*, as before mentioned, which are connected by vertical division plates, *c d*, to form, as it were, three passages when the plug is in the barrel, one of the passages, *e*, being between the plates *a d*, so as to lead the gas direct through the body, while the other passages, *f g*, are formed between the outsides of the vertical plates, *c d*, and the inside wall of the barrel, A. The edges of one end of the vertical plates are of the same thickness as the body of the plates, or they may be a little thicker, to obtain a little more bearing surface, if desired; but the edges on the other ends have plates or pieces, *h h*, projecting from both faces, as shown in the sectional plan in fig. 2. These pieces have a surface corresponding in size with the face of the barrel between every two openings or passages, and each of the pieces are somewhat larger than the openings themselves; so that when the pieces lie across two of the openings the openings are entirely shut off, and the gas is caused to flow through the barrel in another direction. By this arrangement the gas may be directed straight through the body of the barrel without passing into any vessel; or, should it be desirable to lead it through a vessel before it passes on through the continuation of the pipe, the plug is shifted partly round, so that its passage is diverted, whereby it is led into the vessel from one connection, as at *i*, and then out of the vessel by another connection, *j*, and away through the continuation, *k*, of the main pipe, as represented in fig. 3, so that, should the tap be fitted to such vessels as gas-purifiers, the gas can be led through the same by simply turning the plug in the proper direction and the given distance. The plug is fitted in a barrel having six ways or passages, and it is arranged mid-distance between purifiers, as shown; when it is necessary to pass the gas through two purifiers in succession the plug is turned to the position represented in fig. 4. The gas, after passing through both purifiers, can be allowed to flow to the gasometer to be stored, or to any other apparatus for after treatment, as found desirable. The stem or head, *l*, of the plug passes up through a cover or top plate, *m*, which is secured in place by pins to the flange on the barrel, so that the plug works in the same in a gas-tight manner. The lid or top plate is easily removable by releasing the pins, when the plug can be taken out for repairs or examination. The taper of the plug is such that it does not become fixed in the barrel from disuse. In some cases a bar, *n*, is fitted on the plug-head, *l*, with a depending pin, *p*, to drop into holes provided for it in the cover, so that the plug can be retained in any position for any length of time, as circumstances may dictate. The head of the plug may be provided with a key, so that it can be moved by hand, which would be advisable for small-sized taps, but when large taps are employed a wheel may be placed upon the head, and put in gear with a pinion and a crank handle. Holes may be formed in the barrel or in the lid for oil to pass through to lubricate the plug.

In the foregoing description the patentees have referred more especially to fitting the taps to gas purifiers, but they are equally applicable for water mains, and they state they will be found of great service if fitted to large water-pipes, as the water can be directed into almost any direction, and in the case of passing the water through a succession of filtering beds or basins, all impurities may be washed from it before it is allowed to be used. Among the advantages in the employment of these taps when fitted to gas purifiers, when such are used in pairs, is that either one of the purifiers can be shut off from each set, so that it can be cleaned or repaired without stopping the passage of the supply.—*Mechanics' Magazine.*

FOREIGN MINES.

ST. JOHN DEL REY.—The directors have received the following report, dated Morro Velho, June 17: Morro Velho produce for May, 30 days, 10,544 oits., from 3811 tons ore yield 2·776 oits. per ton. Morro Velho cost for May, 4800*l.*; loss, 723*l.* Morro Velho produce eight days of June, 2263 oits., yield 2·204 oits. per ton. The cost has been increased by the unexpected and temporary increase in the exchange of 2¾d. per milreis, which circumstance increases the loss above shown by 574*l.*

DON PEDRO.—Mr. F. S. Symons reports for May: Produce, 6239 oits., at 8s. 6d. per oitava, 2660*l.*; cost, 4202*l.*; loss, 1542*l.* The cost is very high; several unusually heavy items have been charged. The work excavated has been poorer than in April both generally and from a less supply sufficiently rich for boxes. I regret this, as our cost is unusually high, owing principally to a large quantity of timber bought and value of same written off in cost. General work below the average, and little sufficiently rich for boxes encountered. Very little has been excavated from "canoa" in underlie lode, owing to water. We are striving to drain a portion of this under difficulties, so as to have some good work, until it is more effectually drained by sinking Vivian's shaft. Erection of water-wheel for this purpose is progressing in a most satisfactory manner. Although lodes in Alice's west are at present poor, we still hope and believe that large quantities of gold will be discovered in connection with them.

ANGLO-BRAZILIAN.—Mr. F. S. Symons reports for May: Produce, 2592 oits., at 9s., 1166*l.*; cost, 1682*l.*; loss, 516*l.* The works have proceeded with the usual regularity, but the produce much below that for April. A general falling off in the auriferous quality of the stone has been the cause. A little alteration for the better is manifesting itself in the stopes of Foster's west. Lode is making in footwall of Dawson's.

ROSSA GRANDE.—Mr. Ernest Hilcke reports for May: The gold return for the month amounts to 1101 oits., derived from 125 tons of ore, yield 8·8 oits. per ton. Total cost for the month, 1221*l.* The general works have been carried on steadily. Owing to the harvest time, the attendance of natives has been somewhat less than of previous month, and only fair duty has been done in the mine. In Mina da Serra the stone from the mine has been this month of a very low percentage, causing a considerable drop in the produce, principally owing to the great diminution in the size of the lode of the general stopes. In Cachoeira Mine the run of the lode from Mina de Serra has been intersected by the adit, and samples from the lode have been taken at this point, which may produce from 3 to 4 oits. per ton. Information received from persons who have known this mine when worked by the former proprietor, that in following the old workings west we shall meet with a far richer lode than that intersected by the cross-cut, has induced us to extend the operations westward first.

GENERAL BRAZILIAN.—Capt. Thomas Treloar reports for May: Results from explorations very pleasing. The cross-cut to Davey's shaft, now called "Davey's cross-cut," is penetrating jacotinga of a promising character, and at one place a line was intersected showing gold in the samples. When said cross-cut is communicated to Davey's shaft this auriferous line will be extended on. At Davey's shaft the auriferous line discovered improved in descending; in order, therefore, to explore it at a deeper horizon a new cross-cut, called "Silva's" has been commenced. At Itabira good samples of gold continue to be taken. Favourable samples of gold have also been taken from Cauga, and by making good road for transit of same it will pay well for working.

TAQUARIL.—Mr. T. S. Treloar reports for May: In my report for last month I had the pleasure of advising the completion and successful putting to work of the pumping machinery. On the present occasion I have the equally pleasing duty of reporting that the top lode has been intersected in Martin's cross-cut, at a distance of nearly 20 fathoms eastward of old shaft, and that several samples taken from lines contained therein showed gold. Meeting with auriferous matter so far eastward is a circumstance which, I need scarcely add, in no ordinary degree enhances the company's already brilliant prospects of success. The pumping-engine is working well, with one-half of our water power.

ECLIPSE (Gold).—Capt. James Barratt, June 18, advises: Part of the materials for our inclining track (railroad) from mine to the base of the mountain has arrived to-day. We shall now commence operations at the mine. All our staff are in excellent health, and the works progressing as fast as circumstances will allow.

EXCHEQUER.—June 27: During the week ending June 25 the men have been employed in pumping water from the winze, which is now quite dry, laying iron tram rails, and raising air-shaft 12 ft. We have also sent a few tons of low grade ore to the Markleville mill for reduction. You will have the result next week. Mr. Arthur F. Wheeler has been here since the 17th, and expresses himself as highly satisfied with all he has seen in connection with the property. He will send you a report upon the mine on his return to New York.

ANGLO-ARGENTINE.—Capt. Joseph Vivian reports for May—South Mines, Capitan—Main Lode: The engine-shaft is sunk from surface 33 fms. The shaftmen have been employed most of this month in cutting a plat at the 32, which is completed, and everything made ready for sinking the shaft below, which will be pushed on as fast as possible. The cross cut driving east of the engine-shaft at the 20 is in 6 fms. The adit level is driven north of the cross-cut 2 fms.; the same level is driven south 3 fms.; the lode in both of these ends continues to open out well.—Manager: The cross-cut driving east in the base of the hill is now in 30 fms.; the end is very near the lode.—Director: The cross-cut driving in the base of the hill, towards the main lode, is in 9 fms.; no change in the ground since last report.—North Mine, "Colonel:" The engine-shaft is sunk from surface 20 fms., at which point a plat is being cut; when this is completed sinking the shaft will be resumed.—Surface Works: The engineers are making good progress in putting the boilers together for the stamping-engine. Masons are at work building loading for balance-bob at the south engine-shaft. We are busily engaged in making ore floors at the "Capitain" and the "Manager." All our other works are going on as usual.

BRAGANZA (Gold).—W. H. Richards, June 16: I mentioned in my last that the small stamping-mills would be ready in a few days; they are now completed. I herewith send you a rough sketch of our workings, and I think this will convey to you an idea of what we are doing, and the objects we have in view. The main object is to cut the lode in the deep adit, which has been driven 18 ft. since the 31st ult., and it is now in 194 ft.; we have not yet intersected any mineral, but the water is daily increasing, which is considered a strong proof of our approaching the lode. In the tramroad level we have driven about 14 ft., and it is now in 132 ft.; the last 6 or 7 ft. through the same lode as was cut in shallow cross-cut, and we are scarcely through it yet; the lode has a very promising appearance, and all the samples from it show gold; this makes the third lode cut in this level within 10 fms., the whole three being 20 ft. wide, without taking into consideration the small veins of quartz that have been intersected. There is now about 100 tons of lode-stuff ready for stamping, and were it necessary we could break 30 tons daily.

[For remainder of Foreign Mines see to day's Journal.]

DIET OF BELGIAN MINERS.—The miners of Belgium eat, according to the report made in the locality, 2 lbs. of bread per day, about 2 ozs. of butter, 1 oz. of coffee and chickory mixed, while for dinner they have in the evening a portion of vegetables mixed with potatoes, weighing at the most 1½ lb. They have meat on Sundays and festivals, but during the week they drink neither beer nor other fermented liquors. Coffee is their only beverage. Yet these workmen are hardy and healthy. It is not the coffee which sustains them, for it constitutes but 1-35th of the nutritious properties of their ailment, though M. de Gasparin, in a paper read some years ago before the French Academy of Sciences, attempted to prove, from certain tables that the waste in liquid excretion is less where coffee is drunk than at other times. The miners' coffee is not like the French *cafe au lait*, for it has but 1-10th part of milk in it; he drinks several pints in a day, and eats only bread and butter until the vegetable meal of the evening. The albuminous substance which enters into the rations of the Belgian miner is thus reduced from 23 grammes to 15 grammes of azote. This is less nutritious even than the diet of the monks of La Trappe, at Aiguebelle. Here is, therefore, proof that life and health can exist throughout a whole population with less nutritive substance than is generally considered necessary.

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